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The New Standard Environmental Inventory Questionnaire for Estimation of Indoor Concentrations

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Several investigators have developed indoor air quality questionnaires for use in field studies. The approach used in many of them have numerous features in common, but most of them are unique in their content (wording, format, item selection). It is thought that indoor air quality research could be greatly advanced if the primary or fundamental questions and instruments could be consolidated. The use of a basic set of "standard" questions would permit intercomparison of results from different research studies. It is generally agreed that environmental inventory questionnaires (EIQ) help to classify, at least in screening, relative concentration estimates, which precede exposure estimation. Thus, such instruments are not equivalent to monitoring for exposure assessment. However, data linkage and mega data bases are important for some comparative analyses of exposure assessment and exposure-response relationships. Standard instruments such as the EIQ are useful as a screening device to precede other tests to allow identification of potentially high exposure situations. They can also amplify information from other tests. General usage of standard questionnaires and protocols can lead to cumulative improvements in data collection, specificity and effectiveness. This has been the rationale for the present efforts by investigators to form a standardized environmental inventory questionnaire, under the auspices of the U.S. Environmental Protection Agency (EPA), Gas Research Institute (GRI), and Electric Power Research Institute (EPRI).

Environmental Inventory Questionnaires are used to systematically identify several important factors that affect indoor air quality (IAQ) in the initial stages of IAQ studies. It is recommended to do so through the use of a standard EIQ which would permit comparisons of different studies.[4]

EIQs should be part of the protocols for exposure assessment in order to: (a) screen, prior to further work-scope activities, to determine when and where monitoring is necessary; (b) help determine effects of occupant activity, on expected concentrations; (c) use the described characteristics for modeling concentrations; (d) estimate relative concentrations, if monitoring is not possible. Monitoring which may be used with such a questionnaire should be explored during the study design phase as well,[5,12-16] keeping in mind subject burden.

General source and removal factors related to indoor pollutants may apply to all surveys,[1] but others will depend on specific purposes of a study, and the air quality or building parameters of interest.[5] These additional items allow an evaluation to focus on those factors that are most likely to be important in a given context. Subsets of subjects, locations or concentrations (from specific question modules) of special interest can be identified in the process, to allow focus within the limitations of the study.

For evaluation of exposure-response relationships, proportional impact can be estimated if the total exposures and the distributions of such exposures in populations are known.[3] (Most studies involving health endpoints are utilizing standardized health questionnaires and objective tests, with standardized instructions.)[4] Field studies must rely on questionnaires as well as objective testing for accurate estimates of exposure-response estimates.[4-6] The use of questionnaires is the most practical and economical screening procedure in field studies.[4] The effectiveness of a questionnaire depends on its precise content, which must be related to the objectives of the study/survey, and to the details of its design, pretesting and method(s) of administration.[4,7-11] Both depend heavily on the survey design and the expertise of those creating the questionnaire.[4,7-11]

History

Prior standardization efforts were used to help create the EIQ. The objective to create a standardized EIQ was developed initially by members of the National Research Council/National Academy of Sciences Committee on Indoor Pollutants in 1981,[58] it was discussed further at various national and international meetings of those interested in determining indoor and total exposures, and approved at a meeting of

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the Air Pollution Control Association Indoor Technical Committee. Progress did not occur until the agencies that fund most indoor air pollution research agreed to sponsor and promote it. It has had the financial support of three funding agencies (Environmental Protection Agency/Health Effects Research Laboratory, Electric Power Research Institute, and Gas Research Institute). It has been promoted by various other governmental agencies that have a stake in the objectives. In an effort to begin to formulate questionnaires that would meet some of these objectives, an Environmental Inventory (EI) Working Group (EIQWG) was formed from researchers who are actively working with these instruments; it met for the first time in June 1986.[12] The primary objective of this first meeting was to identify those factors related to the mechanisms of IAQ, to identify questionnaire items that were related to these factors and that were thought to be supported by monitoring results. The EIQWG participants represented many of the exposure studies underway in North America and some in Europe, and continued their activities as a WG after the first meeting in 1986. Many of the participants met at an American Society for Testing and Materials workshop in early 1987, to present the concepts to a broader audience and to work further on standardization relative to IAQ surveys.[5] The second pre-APCA workshop was held in June 1987, and further sub-group meetings were conducted subsequently. The primary objective was to develop a draft EI questionnaire (EIQ) that would yield information needed to characterize non-industrial types of buildings. The third workshop was held in June 1988. To date, a basic standard EIQ, instructions for its use, and ancillary questions have been formulated and approved. (The basic standard EIQ appears at the end of this article.) Ancillary questions are recommended for use when more information for a given module is desirable. (The ancillary questions are available on request.)

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The Standard Environmental Inventory Questionnaire

Discussions were focused on questions that have actually been used in IAQ and/or exposure studies. Questions utilized should be related to specific hypotheses concerning concentrations of the pollutants. For initial consideration of questions, population correlations with monitoring results were judged to be reasonably good (a form of "validation"), as discussed below. Another criterion was that there was reasonable repeatability (i.e., reliability). It was decided that the EIQ should not be a simple collation of pre-existing questions, as not all of these have had sufficient development (vis-a-vis survey research) or validation. It was agreed that the EIQ would be based on survey research principles and techniques for development (including format and wording); pilot testing for comparisons to "old" instruments was recommended (see below).

The group developed a structural outline of the various topics covered in the indoor air quality questionnaire.[5] This structure has two major parts: a) primary or initial questions; and b) follow-up questions used during the site visit or when monitoring was done. The conceptual model of IAQ used to derive "important" factors is based on the physical mass-balance model, which separates the "input" (sources) and "output" (removal) factors.[1] Studies correlated answers to their questionnaires and results of monitoring for the following topics: 1) *Core*—characterization of structure; 2) *Sources, Use*—presence and use of space heaters, cooking stoves, smoking; 3) *Removal Mechanisms*—air exchange, sinks, mixing, air cleaning; 4) *Activities*; 5) *Consumer Products, Organics, Pesticides*; 6) *Radon*.

It was agreed that the EIQ should be used to identify type of structure, sources, their use, etc. These are important for accurate understanding of the answers yielded from the EIQ, and these would provide estimates of *concentrations*. Also, responses should be specific concerning *space and time, multiple contaminants, usage/activity*, and whether the exposure is *individual* or *population* based.

Core Questions

U.S. Census questions, that have been previously tested,[42] are used for identification purposes. This permits direct comparison with recent census data to help evaluate sources of bias in the sample relative to the base population.[43] Demographic and socio-economic questions are also asked, as these factors may influence both exposures and responses to air pollutants.[2,43,45,50] For example, low income populations may be more likely to live in poorly insulated houses with higher air exchange rates and may use ovens or unventilated space heaters for supplemental heat (ibid.).

Questions on the physical nature of the housing are essential to characterize the indoor space (the chamber in which exposures occur).[5,43,45,49–50,52–56] These questions help to characterize the removal mechanisms. Questions on the structure are important especially for some pollutants such as radon (ibid.). Such questions were derived from the Census, the EPA radon survey, and previously-tested questions that were used in conjunction with monitoring (ibid.); they have been shown to be reliable and valid in exposure-assessment. Some studies used technicians to evaluate homes;[44,46,50] those results have helped to determine which questions yielded valid responses.

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Questions on Sources and Usage

These questions are essential to estimate concentrations of the most common gases and particulate matter (PM) indoors. A good example is nitrogen dioxide (NO_2). It has been shown that personal NO_2 exposure is explained primarily by indoor concentrations.[44,47] Questions characterizing appliances and their usage have been asked in surveys, with concomitant monitoring;[44–53,59,60] those correlating well with monitoring results were incorporated. Usage questions have been especially important, such as range/oven use, exhaust fan usage, and use of open windows.[45,50,59,60] Questions on particulate sources, such as wood burning and tobacco smoking (ETS), have been asked as well in surveys with monitoring.[45,52,54–56,61] Again, correlational information was helpful in the selection of the best questions to incorporate. Consumer products, ETS, and other sources of organic pollutants (VOCs) are other, special sources of indoor air contaminants. For questions on VOCs, the EPA TEAM survey questions were incorporated.[13]

Removal Mechanisms

Housing characteristics, potential sinks, types of ventilation and usage have been considered important influences on concentrations of contaminants, and questions have been used in several surveys.[48–53,55,56,59] The results of these surveys and modeling (see above) have been used to choose questions for the standard EIQ. Infiltration-driven factors are important, especially for radon daughters, and are in the EIQ.

Questionnaire Development Principles

Design. In the construction of questionnaires, it is essential to formulate precise questions to reduce variations that may result from different observers and different subjects.[4,20,21,25,28,29,36,41] Questions should be complete, well-conceived, self-explanatory and answerable in an adequate (useable) manner.[20,21,25,29,35–37] One should avoid ambiguity, vagueness, jargon (*ibid.*). Responses should be complete, mutually exclusive and have sufficient response categories; simplicity, neutrality, and common concepts and language are highly preferable.[20,21] There are many other design questions that are addressed based on survey research methods, including the format of the questionnaire and question order,[8,9,20,25–27,39,40] the use of short introductions as transitions and explanations,[6,27] the temporal gap between event and recall.[8,38–40] Further issues addressed include the length/wordiness of questions, for which there are conflicting, though mostly positive results,[27,38,39] the use of open vs. closed answers, fixed choices, categorical vs. continuous answers,[7,27,38,39] and the use of conditional questions to minimize time spent.[7–9] Respondent burden should be minimized; each question should be essential, useful, and analyzable to meet specified objectives.[5,29,41] These principles were followed in the construction of the EIQ.

The relationship of the questions on sources and uses should be clearly stated so the person or persons answering these questions will know the context in which they are being asked;[3,5] as seen in the questionnaire attached. One should know the relationship of the respondent to the building (owner, renter, head household), as it is an important factor in the responses on questionnaires.[5] Identification questions were placed first to be part of first stage screening.[5,27,42]

To improve the validity of the questionnaire, the items being assessed must be defined accurately.[4,29] Reproducibility can be affected also by measurement variability, requiring internal and external consistency checks.[4,20,22,26,28] The questions should be evaluated for their value and reliability in obtaining the same information when the questionnaire is used by different investigators in different locales using similar measuring or monitoring equipment.[5] The determination of whether the EIQ is obtaining fact or perception can be tested by the use of technician evaluations as well as monitoring.[5]

Administration. Interobserver measurement variability in a study can result in the indiscriminant pooling of heterogeneous results. It can also produce systematic differences between studies, even if identical or very similar questions were used, so that measurement differences could be mistaken for differences between populations.[4,29,57] Quality assurance checks can be incorporated into surveys to examine interobserver reliability and differences.[4] Thus, the method of administering the questionnaire should be standardized and the interviewers comparably trained to reduce these systematic differences.[4,7,8,20,21,23–28,35–38,41] Self-completed versions of the questionnaires have been developed to avoid the problem of observer variation and bias.[4,7,8,20,21,23–26,28,30–34] They have been shown to be reliable and valid (ibid.). They can be used when personal contact is not practical, and because they are more economical than personal interviewing.[4,7,8,30–34] No matter which method of administration is used, one should strive for fast and easy completion.[20,21]

Coding Procedures. These should be determined during initial construction; code books, instructions, and quality control procedures should be developed before the questionnaire is used.[4,6,9,10,23,25,28,29,41]

Pre- and Pilot Testing. The EIQ questions, on the whole, have been pre-tested, as they come from other sources, and they should be understandable to almost all subjects.[5] Thus, exploratory evaluations of attitudes and experience have helped develop working and data specifications.[26] Pilot studies[23,25–27] are underway, and item analysis[6,9,35] is still necessary. Pilot studies using the EIQ in conjunction with monitoring and technician evaluations can provide for assessment of reliability and validity as well.[5] Creations of scales/indexes[5] can be tested during pilot studies also.

The training of interviewers and technicians is improved by the pilot study, and it allows for determination of interobserver differences, and corrections. Suggestions for further pre-testing and pilot studies have been provided (ibid.), especially by NCHS[9–11,38] and Kollander et al.[26] Likewise, staffing and organizing field operations have been addressed by WHO[4] and EPA.[29]

Future Work

The participants and sponsoring agencies concluded that there is still a necessity to put these EIQs to work, to complete the appropriate information collection for exposure assessment. Some agencies and investigators have utilized parts of the standard EIQ already, and others were waiting for its finalization. Sponsoring agencies should continue to support its use in all their indoor air quality, exposure and health effects studies and for research conducted by other agencies and investigators. It would be especially beneficial to use some standard modules in parallel with current EIQs, either in split-half or test-retest designs (for reliability testing); random cross-over designs could be used for this purpose. This would provide information about comparability with current data collection and both usefulness and "usability" of the new standard EIQ. Supporting data relevant to the questions/modules used in the standard EIQ, of the type discussed before (i.e., correlational data/"validation"), documentation, manuscripts, and/or contract reports are still being sought. This further documentation would be helpful to support use of the new standard EIQ.

Discussion

Pollutant concentrations are functions of static characteristics related as building design and structure and dynamic

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activities related to source and removal factors. These characteristics and activities can be identified using EIQs and supplementary questionnaires and usage logs. The resolution in terms of time periods and detail of information needed for a specific study is a function of the study's objectives. The objectives may imply that a Usage Log should be used: 1) to model exposure from the data from the questionnaire and from emission rates; and 2) to explain variance in exposure from the questionnaire and from monitoring results (e.g., classification). By usage, reference was to appliances, and ventilation. The time frames were: concurrent, h/day, day/wk or per month, and seasonal. The questions could range from dichotomous to continuous; it was felt that there was more predictability (and less recall error) with *less* detail asked. Usage questions have been formulated for: range-burners, ovens, space heaters, exhaust fans, windows. Ancillary questions were thought useful for: usage of woodstoves, fireplaces, A/C, evaporative coolers, gas dryers, presence and use of fans and doors, and presence of a furnace in the living quarters. For ETS, follow-up, repeat questions should be asked, in reference to a particular day and/or week. Some activity usage of VOCs would be asked, as would some follow-up questions. Ancillary questions would be asked about sources of aero-allergens. Monitoring was discussed as desirable in concert with usage logs, specifically continuous vs. integrated (24 h vs. 72 h vs. 7 d).

Diaries have been discussed at various times. Time log diaries, especially useful for time/motion activities, have shown good correlation with monitoring results.[62] Full appreciation of their usefulness/value as predictors of concentrations is being determined currently. (It has been noted that educational level does not correlate well with "keeping" diaries.) The working group would like to have determined the space-time resolution needed/desired. However, this depends on the needs of a given study and monitoring performed in conjunction with the diary. (There was discussion of having automatic registers of indoor/outdoor/transportation locations.) There was also discussion of present diaries, with or without personal monitoring. It was decided that classifications (e.g., worker vs. student vs. non-worker, and weekday vs. weekend) needed to be discussed, as well as the three basic types of diaries: fixed (integrated categories for locations, fixed vs. open times), continuous (open time and location), and administered.[19]

Technician Assessments have been discussed as well. These would be for accurate and reliable assessment of information/measurements on building factors, record keeping, instrumentation use, and monitor placement.[44,48,50] Since technicians would have to be trained, guidelines on this training would be necessary. The information to be collected would include: a) volume of the indoor environment; b) results of inspection of water heater, furnace, etc., for venting, leakage, size and type of pilot light(s), appliance efficiency ratings; c) make and model of wood-burning stoves, space heaters (by type), fireplace and type of flue, room cleaners; d) visible dust ("level"); e) questions on visitors in home; and f) information on construction of foundation and lowest floor of living quarters.

Survey research and epidemiology have shown that standard questionnaires are necessary to allow comparisons between subjects as well as between studies; they help ensure that data represent "nonbiased" responses.[7–11] Several factors have been shown to determine the reliability and the frequency of affirmative responses to questions: the mode of administration, phrasing, order, sequence and time of administration, and types of responses permitted.[7,11,20–22,24–29,35–38] Measurement of reliability and validity represent critical aspects of instrument creation and evaluation.[5] Standardization also specifies the details needed for precise administration and coding by personnel; these can have large impacts on the overall effectiveness of the questionnaire. Thus, general usage of standard questionnaires and protocols can lead to cumulative improvements in data collection, specificity and effectiveness.

Disclaimer

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Source: https://www.industrydocuments.ucsf.edu/docs/nlgj0001

Basic Standard
Environmental Inventory Questionnaire*

Basic Household Characteristics

Name of designated head of household: _____

Name of Respondent: _____

Home address: _____

Home phone: _____ Zip code: _____

Date: ____/____/____

This is a questionnaire for you to complete, regarding your present living quarters. Most of the questions asked are about the materials, appliances and furniture that are used within your home.

To record your response(s) circle ( ), check [ ] or write *in* the responses to each question. Please follow the arrows pointing to the side questions inside of boxes. For most of the questions in bold print, a "no" response will instruct you to "skip to" the next bold printed question. You can reach us at _____ or _____ if you have any questions.†

We appreciate your assistance in this study.

Your answers will be kept confidential and used for research purposes only.

Thank you for your cooperation.

Identification/Core Module For Proposed Standard E.I.Q.

A. Location Data

State _____ County _____ (2)‡

Census tract _____ Block # _____ (5,5)

Street address: _____/_____ (20)
Apt./space #

City, zip _____/_____ (20,5-5)
Zip code

Name of respondent _____ (2)

B. Housing Characteristics

These questions are to determine the type of housing unit and living quarters in which your household lives. Circle one number only for each question.

B1. How many rooms do you have in your living quarters?
(Do not count bathrooms, porches, balconies, foyers, halls, or half-rooms.)

Please Circle: 1 2 3 4 5 6 7 8 9+ (1)

B2. Are your living quarters—

1. Owned?
2. Rented?
3. Other? (1)

B3. Which best describes this building?
(Include all apartments, flats, etc., even if vacant.)

1. A mobile home or trailer
2. A one-family house detached from any other house
3. A one-family house attached to one or more houses
4. A building for 2 families
5. A building for 3 or 4 families
6. A building for 5 to 9 families
7. A building for 10 to 19 families
8. A building for 20 or more families
9. A boat, tent, van, etc.
10. Other, please specify: _____ (1)

B4. How many stories (floors) are in this building?
(Count an attic or basement as a story if it has any finished rooms for living purposes.)

1. 1 to 3
2. 4 to 6
3. 7 to 12
4. 13 or more stories (1)

B5. About when was this building *originally* built?
(Circle when the building was first constructed, not when it was remodeled, added to, or converted.)

1. 1986 to present
2. 1980 to 1985
3. 1970 to 1979
4. 1960 to 1969
5. 1950 to 1959
6. 1940 to 1949
7. 1939 or earlier
9. Don't Know (1)

B6. When did your household/family move into this house (or apartment)?

1. 1986 to present
2. 1980 to 1985
3. 1970 to 1979
4. 1960 to 1969
5. 1950 to 1969
6. 1940 to 1949
7. 1939 or earlier (1)

B7. How many bedrooms do you have?
(Count room used *mainly* for sleeping even if used also for other purposes.)

0. No bedroom
1. 1 bedroom
2. 2 bedrooms
3. 3 bedrooms
4. 4 bedrooms
5. 5 or more bedrooms (1)

B8. Where are cars/vehicles usually parked near your living quarters?
(Circle all that apply)

1. In an underground garage
2. In an attached garage
3. In an attached carport
4. On the street next to living quarters
5. Other (Specify): _____ (1)

C. Occupant Characteristics

The following questions describe the members of the household.

* Basic EIQ. Final: 3/15/89.

† Instructions refer to formats which are found on the original questionnaire. Further instructions for the Environmental Inventory Questionnaire are available from the authors.

‡ Numbers in parentheses indicate field lengths.

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Source: https://www.industrydocuments.ucsf.edu/docs/nlgj0001

C1. Number in household

(a) How many children under age 18 are there living in the Household?

_____ Number of Children (2)

(b) How many adults, ages 18 and older, are there living in the Household?

_____ Number ages 18–61 (2)
_____ Number age 62 or more (2)

For the designated head of the household
(Please identify one person as the head and answer the following questions for this individual)

C2. What ethnic group (race) does this person consider themself? (circle one only)

1. White, Non Hispanic
2. Hispanic
3. Black
4. Asian
5. Other (specify): _____ (1)

C3a. What is the highest grade (or year) of regular school this person has ever attended?
(For example, completion of high school = 12)

_____ Highest grade attended (2)

C4a. Does he/she have a paid job out of the home?

1. No, self employed in the home
2. No, full time homemaker
3. Yes, working full time
4. Yes, working part time
5. No, out of work just now but usually employed
6. No, a full-time student
7. Other, (specify): _____ (1)

C4b. Occupation
[ ] check here if this person has never worked outside of the home, and skip to next question.

1. What is or was his/her usual occupation? _____ (3)

2. What is his/her job title?: _____

For the respondent
(if not the Head of Household)

C5. What ethnic group (race) do you consider yourself? (circle one only)

1. White, Non Hispanic
2. Hispanic
3. Black
4. Asian
5. Other, (specify: _____) (1)

C6a. What is the highest grade (or year) of regular school that you have ever attended?
(For example, completion of high school = 12)

_____ Highest grade attended (2)

C7a. Do you have a paid job out of the home?

1. No, self employed in the home
2. No, full time homemaker
3. Yes, working full time
4. Yes, working part time
5. No, out or work just now but usually employed
6. No, a full-time student
7. Other, (specify): _____ (1)

C7b. Occupation

[ ] Check here if you have never worked outside of the home, and skip to next question.

1. What is or was your usual occupation? _____ (3)

2. What is your job title: _____

D. Smoking in the Home

1. Does anyone regularly smoke INSIDE OF YOUR LIVING QUARTERS?

1. Yes — Continue below
2. No — Skip to #E1 (1)

2. How many cigarettes, pipefuls, and/or cigars were smoked IN YOUR LIVING QUARTERS?

(a) During the most recent WEEK DAY:

_____ # cigarettes _____ # pipes and/or cigars (5)

(b) During the most recent WEEK END DAY:

_____ # cigarettes _____ # pipes and/or cigars (5)

E. Cooking and Other Appliance Usage

E1. Cooking

(a) Do you have a gas range or oven?

1. Yes — continue below
2. No — skip to #E2 (1)

(b) Does your GAS range or oven have a continuously burning pilot light?

1. Yes 2. No (1)

(c) During the winter, do you ever use the range or oven to help heat the living quarters?

1. Yes, three or more days per week
2. Yes, one or two days per week
3. Yes, only in the morning to take the chill off (less than one hour) (1)
4. No

E2. Water Heater

(a) Is there a GAS water heater in your living quarters?

1. Yes — continue below #E2(b)
2. No — skip to Question #E3

(b) Where is your water heater located?
(circle all that apply)

1. In a room within the living quarters, such as the kitchen.
2. In a closet or storage room in part of the main living quarters.
3. In a utility or closet room separate from the main living quarters.
4. In the garage.
5. In the basement.
6. Outside.
7. Other (please specify _____) (1)

E3. Clothes Dryer

(a) Is there a clothes dryer in your living quarters?

1. Yes — continue below #E3(b)
2. No — skip to #E4

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(b) Is your clothes dryer gas or electric?

1. Gas
2. Electric
3. Don't know

(1)

(c) Where is the clothes dryer located?

1. In a room within the living quarters, such as the kitchen.
2. In a closet or storage room in part of the main living quarters.
3. In a utility or closet room separate from the main living quarters.
4. In the garage.
5. In the basement.
6. Outside.

(1)

(d) Is the dryer vented?

1. Yes, always outside.
2. Yes, with an inside/outside switch.
3. Not vented to outside.
4. Don't know.

(1)

E4. Heating System

(a) What is the main type of fuel used to heat your living quarters? (circle the one most often used)

1. Gas
2. Electric
3. Fuel oil
4. Kerosene
5. Coal
6. Wood
7. Solar
8. None — Skip to #E5
9. Other (Specify) _____

(1)

(b) What is the main type of furnace or heating system used to heat your living quarters? (circle one)

1. Forced air (central system with ducts that blow air into most rooms)
2. Wall furnace
3. Steam
4. Hot water
5. Floor furnace
6. Gravity furnace
7. Portable heater
8. Other (specify: _____) (1)
9. None

E5. Unvented Space Heaters:

(a) During the cold weather, do you use portable KEROSENE heaters in your living quarters?

1. Yes — How many? _____
2. No — skip to #E5(c)

(2)

(b) How often do you use your KEROSENE heater during the cold weather?

1. Three or more days per week
2. One or two days per week
3. Only in the morning to take the chill off (for less than one hour)

(1)

(c) Do you use any small GAS heaters in your living quarters?

1. Yes — How many? _____
2. No — skip to #E6

(2)

(d) How often do you use your GAS heater during the cold weather?

1. Three or more days per week
2. One or more days per week
3. Only in the morning to take the chill off (for less than one hour)

(1)

(e) Is the flame visible?

1. Yes
2. No

(1)

E6. Wood Stove and/or Fireplace

(a) During the cold weather, do you use a wood burning stove to help heat your living quarters?

1. Yes — How many? _____
2. No — skip to #E6(c)

(1)

(b) How often do you use a wood burning stove during the cold weather?

1. Three or more days per week
2. One or two days per week
3. Only in the morning to take the chill off (for less than one hour)

(1)

(c) During the cold weather, do you use any fireplaces in your living quarters?

1. Yes — How many? _____
2. No — skip to #F

(2)

(d) How often do you use your fireplaces during the cold weather?

1. Three or more days per week
2. One or two days per week
3. Only in the morning to take the chill off (for less than one hour)

(1)

F. Radon

F1. Do you get water for general household use from a city or public system, a private well, or some other source?

1. city or public water system
2. private well supplying 1 or more homes
3. some other source [specify _____]

(1) (1)

F2. What months of the year are the living quarters closed completely because of heating or air conditioning? (ANSWER FOR BOTH HEATING AND AIR CONDITIONING)

1. none of the year (88)
2. all of the year (20)
3. part of the year — circle months below

JAN	FEB	MAR	APR	MAY	JUN
01	02	03	04	05	06
JUL	AUG	SEP	OCT	NOV	DEC
07	08	09	10	11	12

(2)

F3. Is there a crawl space or open space under any part of your living quarters? (Note: This is a space between the ground and the floor that cannot be occupied; it is not a basement or cellar.)

1. Yes 2. No

(1)

F4. Is any part of the foundation or lower walls of your building built of concrete blocks or cinder blocks?

1. Yes 2. No

(1)

F5. Do you have a full or partial basement, a cellar, or a level of the building for which one or more walls are completely or partially below the ground?

1. Yes 2. No

(1)

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F6. Which of the following best describes the construction of most of the lowest floor of the living quarters?

1. Concrete slab, uncovered
2. Tile, wood, or carpet over concrete
3. Earth, dirt, sand, or rock
4. Something else [SPECIFY _____] (1)

G. Organic Pollutants

G1. Have you worked with or used pesticides or herbicides outdoors for more than 1 hour at a time in the past 6 months?

1. Yes 2. No (1)

G2a. Did you or any member of the household, or a commercial applicator use pesticides in the living quarters in the past 6 months?

1. Yes
2. No — SKIP TO #G3a (1)

b. Specify Brand Names _____ (2)

c. Specifically, where are you using them?

1. Living Room
2. Dining Room
3. Kitchen
4. Master Bedroom
5. Other Bedrooms
6. Other Rooms (6)

G3a. In the past 6 months, were the drapes, carpeting, or furniture in your home steam or dry cleaned?

1. Yes No (1)

G4a. Are you now using mothballs or moth crystals in your living quarters?

1. Yes
2. No — SKIP TO #G5 (1)

b. Specifically, where are you using them?

1. Living Room
2. Dining Room
3. Kitchen
4. Master Bedroom
5. Other Bedrooms
6. Other Rooms (6)

G5. Do you store cleaning supplies (e.g., chlorine bleaches, detergents) in the following places?

1. Kitchen (1)
2. Basement (1)
3. Utility Room (1)
4. Bathroom (1)
5. Other (SPECIFY) (1)

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